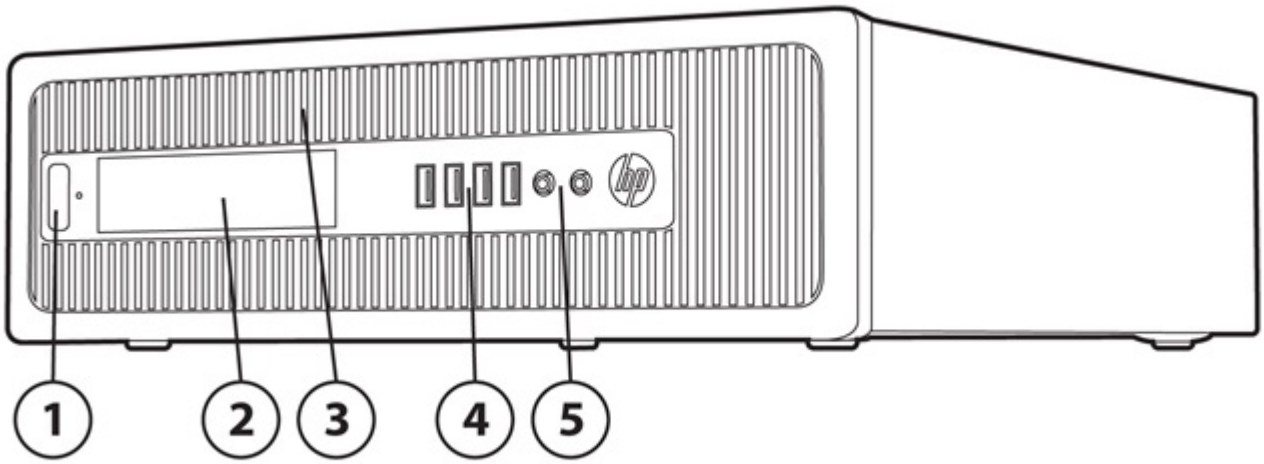
Overview

HP ProDesk 600 G1 Small Form Factor Desktop Business PC



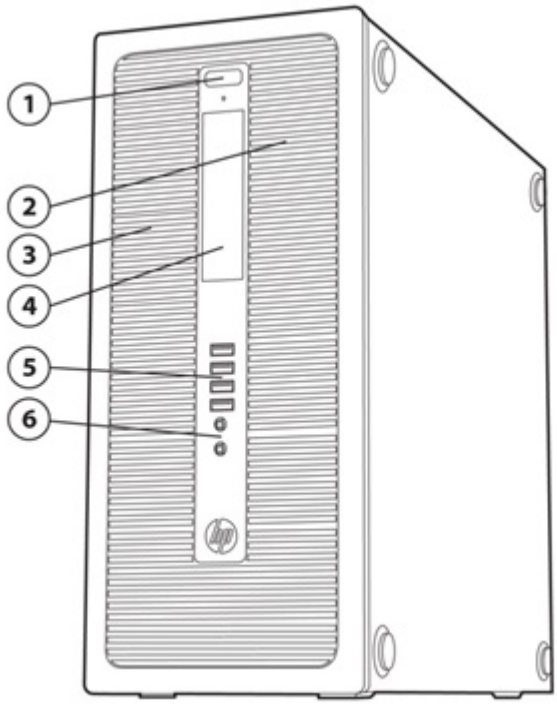
1. Power button and PC status LED
2. 3.5" external drive bay
3. Slimline drive bay supporting an optical disk drive (located behind removable bezel)
4. (2) USB 3.0 ports, (2) USB 2.0 ports
5. 3.5mm headphone output and microphone jack

Not Shown

Slots	(1) PCI Express x16 graphics connectors (3) PCI Express x1 accessory connectors
Bays	(1) 2.5" internal storage drive bay (1) 3.5" internal storage drive bay
Rear I/O	(2) USB 3.0 ports; (4) USB 2.0 ports (1) VGA video port; (2) DisplayPort with multi-stream video ports (1) RJ-45 network connector (1) RS-232 serial port 3.5mm audio in/out jacks PS/2 keyboard and mouse ports

Overview

HP ProDesk 600 G1 Tower Business PC



1. Power button and PC status LED
2. Slimline drive bay supporting an optical disk drive (located behind removable bezel)
3. 5.25" half height external drive bay (located behind removable bezel)
4. 3.5" external drive bay
5. (2) USB 3.0 ports, (2) USB 2.0 ports
6. 3.5mm headphone output and microphone jack

Not Shown

Slots	(1) PCI Express x16 graphics connectors (3) PCI Express x1 accessory connectors
Bays	(1) 2.5" internal storage drive bay (2) 3.5" internal storage drive bay
Rear I/O	(2) USB 3.0 ports; (4) USB 2.0 ports (1) VGA video port; (2) DisplayPort with multi-stream video ports (1) RJ-45 network connector (1) RS-232 serial port 3.5mm audio in/out jacks PS/2 keyboard and mouse ports

Overview

At A Glance

- Choice of Small Form Factor or Tower chassis options
- PC chassis and all internal components and modules are manufactured with low halogen content
- HP developed and engineered UEFI BIOS for better security, manageability and software image stability
- Intel® Q85 chipset supporting Intel 4th generation Core processors, featuring integrated Intel HD Graphics and Intel® Standard Manageability Technology
- Intel® Ethernet Connection I217L GbE LOM integrated network connection
- DDR3 Synchronous Dynamic Random Access Memory (SDRAM)
- Multi-independent monitor support via VGA and dual digital DisplayPort video interfaces with multi-stream
- Discrete graphics options available
- DTS Sound audio management software
- Standard and high efficiency energy saving power supply options
- ENERGY STAR qualified models certified EPEAT Gold
- Guaranteed lengthy purchase lifecycles and image stability

Standard Features and Configurable Components (availability may vary by country)

OPERATING SYSTEM

Preinstalled When Purchased

Windows 8 Pro (64-bit)*
Windows 8 (64-bit)*
Windows 7 Ultimate (32-bit)** (LAR only)
Windows 7 Ultimate (64-bit)**
Windows 7 Professional (32-bit)**
Windows 7 Professional (64-bit)**
Windows 7 Professional (32-bit) (available through downgrade rights from Windows 8 Pro)***
Windows 7 Professional (64-bit) (available through downgrade rights from Windows 8 Pro)***
Windows 7 Home Premium (32-bit)** (LAR only)
Windows 7 Home Premium (64-bit)**

FreeDOS 2.0
Novell SUSE Linux Enterprise Desktop 11

*Not all features are available in all editions of Windows 8. Systems may require upgraded and/or separately purchased hardware, drivers and/or software to take full advantage of Windows 8 functionality. See http://www.microsoft.com.

**Not all features are available in all editions of Windows 7. This system may require upgraded and/or separately purchased hardware to take full advantage of Windows 7 functionality. See http://www.microsoft.com/windows/windows-7/ for details.

***This system is preinstalled with Windows 7 Pro software and also comes with a license and media for Windows 8 Pro software. You may only use one version of the Windows software at a time. Switching between versions will require you to uninstall one version and install the other version. You must back up all data (files, photos, etc.) before uninstalling and installing operating systems to avoid loss of your data.

CHIPSET

	SFF/TWR
Intel® Q85 Express	X

Standard Features and Configurable Components (availability may vary by country)

PROCESSOR

	SFF/TWR
Intel® 4th Generation Core™ i7 Processors	
Intel® Core™ i7-4770 Processor Up to 3.9 GHz Max. Turbo Frequency (3.4 GHz base frequency) 8 MB cache, 4 cores, 8 threads Intel HD Graphics 4600 Supports DDR3 memory up to 1600 MT/s data rate Supports Intel® Stable Image Platform Program (SIPP)	X
Intel® 4th Generation Core™ i5 Processors	
Intel® Core™ i5-4570 Processor Up to 3.6 GHz Max. Turbo Frequency (3.2 GHz base frequency) 6 MB cache, 4 cores, 4 threads Intel HD Graphics 4600 Supports DDR3 memory up to 1600 MT/s data rate Supports Intel® Stable Image Platform Program (SIPP)	X
Intel® Core™ i5-4670 Processor Up to 3.8 GHz Max. Turbo Frequency (3.4 GHz base frequency) 6 MB cache, 4 cores, 4 threads Intel HD Graphics 4600 Supports DDR3 memory up to 1600 MT/s data rate Supports Intel® Stable Image Platform Program (SIPP)	X

GRAPHICS

	SFF/TWR
Intel integrated HD Graphics on all models (depends on processor)	X
Optional Discrete Graphics Solutions	
AMD Radeon HD 8350 (1GB) PCIe x16	X
NVIDIA NVS 310 (512 MB) PCIe x16	X
NVIDIA NVS 315 (1GB) PCIe x 16	X
NVIDIA GeForce GT630 (2 GB) FH PCIe x16	TWR only
Adapters and Cables	
HP DMS-59 to Dual DisplayPort Cable	X
HP DMS-59 to Dual DVI Cable	X
HP DMS-59 to Dual VGA Cable	X
HP DisplayPort to DisplayPort Cable	X
HP DisplayPort to DVI-D Adapter	X
HP DisplayPort to HDMI Adapter	X
HP DisplayPort to VGA Adapter	X
HP Serial Port Adapter	X

Standard Features and Configurable Components (availability may vary by country)

HP Parallel Port Adapter	X

STORAGE

Hard Drive	SFF/TWR
500 GB, 7200 rpm, SATA 6.0 Gb/s, SMART IV, 2.5"	X
500 GB, 7200 rpm, SATA 6.0 Gb/s, SMART IV, 3.5"	X
500GB, 10K rpm, SATA, 6.0Gb/s, SMART IV, 3.5"	X
1 TB, 7200 rpm, SATA 6.0 Gb/s, SMART IV, 3.5"	X
1 TB, 10K rpm, SATA 6.0 Gb/s, SMART IV, 3.5"	X
Hybrid Drives	
NOTE: Solid State Hybrid Drives are planned to be available in October 2013.	
500GB SATA 6G 2.5 (8GB cache) SSHD Drive	X
500GB SATA 6G 2.5 2nd Drive (8GB cache) with 3.5" adapter when install in SFF/TWR	X
1TB SATA 6G 2.5 (8GB cache) SSHD Drive	X
1TB SATA 6G 2.5 2nd Drive (8GB cache) with 3.5" adapter when install in SFF/TWR	X
Solid State Drives	
120 GB SATA 6G 2.5 SSD (with 3.5" adapter when installed in SFF/TWR)	X
128 GB (with 3.5" adapter when installed in SFF/TWR)	X
160 GB (with 3.5" adapter when installed in SFF/TWR)	X
SATA Self-encrypting Solid State Drive	
256 GB (with 3.5" adapter when installed in SFF/TWR)	X
Optical Disc Drives	
Slim DVD-ROM	X
Slim BDXL Blu-ray Writer	X
Slim SuperMulti DVD Writer	X

MEMORY

Form Factor	Type	Maximum	# of Slots
Small Form Factor	DDR3 non-ECC Up to 1600 MT/s	32 GB	4 DIMM
Tower	DDR3 non-ECC Up to 1600 MT/s	32 GB	4 DIMM

NOTE: For systems configured with more than 3 GB of memory and a 32-bit operating system, all memory may not be available due to system resource requirements. Addressing memory above 4 GB requires a 64-bit operating system.

Memory modules support data transfer rates up to 1600 MT/s; actual data rate is determined by the system's configured processor. See processor specifications for supported memory data rate.

Standard Features and Configurable Components (availability may vary by country)

PERFORMANCE

Intel® Smart Response Technology Disk Cache Modules*	SFF/TWR
32GB SATA Solid State Disk Cache	X

* Not available at launch.

NETWORKING/COMMUNICATIONS

Ethernet (RJ-45)	
Intel I217LM Gigabit Network Connection (standard)	X

Wireless	
Intel Centrino Advanced-N 6205 802.11 a/b/g/n PCI Express x1 Network Interface Card (optional)	X

AUDIO/MULTIMEDIA

	SFF/TWR
HD audio with Realtek ALC221 codec (all ports are stereo)	X
DTS Studio Sound audio management technology	X
Microphone* and headphone front ports (3.5mm)	X
Line-out and Line-In rear Ports* (3.5mm)	X
Multi-streaming capable*	X
Internal speaker (standard)	X

* The front microphone port is re-taskable as a Line-in, Microphone-in or Headphone-out port. Rear audio input ports are re-taskable as a Line-in or Microphone-in port. External speakers must be powered externally. Multi-streaming can be enabled in the Realtek control panel to allow independent audio streams to be sent to/from the front and rear jacks. This allows for different audio applications to use separate audio ports on the system. For example, the front jacks could be used with a headset for a communications application while the rear jacks are being used with external speakers and a multimedia application.

Standard Features and Configurable Components (availability may vary by country)

KEYBOARDS AND POINTING DEVICES

Keyboard	SFF/TWR
HP PS/2 Keyboard	X
HP USB Keyboard	X
USB Smart Card (CCID) Keyboard	X
HP USB and PS/2 Washable Keyboard	X
HP Wireless Keyboard and Mouse Combo	X
Mice	
HP PS/2 Mouse	X
HP USB Mouse	X
HP USB 1000dpi Laser Mouse	X
HP USB and PS/2 Washable Mouse	X

HP BIOS

Key features of the HP BIOS include:

- Deployment and manageability - HP BIOS provides several technologies that help integrate the HP ProDesk 600 G1 Series Business PC into the enterprise, such as PXE, remote configuration, remote control, and F10 Setup support for 12 languages.
- Stability - HP BIOS supports the HP stable product roadmap by releasing only critical BIOS changes to the factory and advanced change notification.
- UEFI specification 2.1
- Computrace agent - For tracking and tracing services, available in select countries, separate software and purchase of a subscription is required.
- Thermal and power management - The HP BIOS provides and enables thermal and power management technologies so component temperatures are managed for high reliability and to assist in operating the HP Business Desktop computer in any enterprise environment.
- Acoustic performance - Industry leading acoustic emissions across the range of operating conditions.
- Serviceability - HP BIOS provides diagnostic and detailed service information.
- Upgrades and recovery - HP BIOS provides numerous ways to upgrade HP Business Desktop computers, including BIOS updates from within DOS (DOSFlash), BIOS updates from within Windows (HPQFlash), HP Client Manager, and fail-safe recovery. In addition, the HP Business Desktop BIOS Utilities tool enables replicated BIOS setup throughout the Enterprise; it is available from within the BIOS software and from the support website.
- HP BIOS uses PKI signing of the BIOS for trusted BIOS upgrades and recovery.

Additional HP BIOS Features:

- Power-On password - Helps prevent an unauthorized user from powering on the system.
- Administrator password - Also known as the setup password, this helps prevent unauthorized changes to the system configuration. If the administrator password is not known, the BIOS version cannot be changed and changes cannot be made to BIOS settings using F10 setup or under the OS.
- Advanced Configuration and Power Interface (ACPI) - Represents a significant innovation in power and configuration management, allowing operating systems and applications to manage power based on activity and usage. HP Elite models use ACPI to provide power conservation features.

Standard Features and Configurable Components (availability may vary by country)

S5 Max Power Savings setting supports EU Lot6 requirement and allows the computer to power down below 1W is S5 (when turned off). When S5 Max Power Savings feature is enabled power to slots is turned off along with WOL functionality.

SECURITY

	SFF/TWR
Trusted Platform Module (TPM) 1.2	X
SATA port disablement (via BIOS)	X
Drive lock	X
Intel® Identify Protection Technology (IPT)[1]	X
Serial, parallel, USB enable/disable (via BIOS)	X
Optional USB Port Disable at factory (user configurable via BIOS)	X
Removable media write/boot control	X
Power-On password (via BIOS)	X
Setup password (via BIOS)	X
HP Chassis (1 bay) Security Kit	TWR only
Solenoid Hood Lock / Sensor	X
Support for chassis padlocks and cable lock devices	X

[1]Models configured with Intel Core processors have the ability to utilize advanced security protection for online transactions. IPT, used in conjunction with participating web sites, provides double identity authentication by adding a hardware component in addition to the usual user name and password. IPT is initialized through an HP Client Security module

POWER SUPPLIES

	SFF	TWR
Standard efficiency	240 W active PFC	320 W active PFC
High efficiency	240 W 90% efficient active PFC	320 W 90% efficient active PFC
	240W 92% efficient active PFC	320W 92% efficient active PFC

ENVIRONMENTAL & REGULATORY

ENERGY STAR® qualified models available

EPEAT® registered where applicable/supported. See www.epeat.net for registration status by country.

Low halogen (chassis, all internal components and modules)

TAA compliant

Standard Features and Configurable Components (availability may vary by country)

PORTS

I/O Ports - Standard

	SFF/TWR
USB 2.0	2 (front) 4 (rear)
USB 3.0	2 (front) 2 (rear)
Serial (RS-232	1
PS/2	1 keyboard (purple 1 mouse (green)
Video	1 VGA (analog) 2 DisplayPort with multi-stream
Audio	3.5mm headphone & mic jacks (front) 3.5mm audio in & out jacks (rear)
Network Interface	1 RJ-45

I/O Ports - Optional

	SFF/TWR
2nd Serial (RS-232)	1
Parallel	1

SLOTS

	SFF/TWR
PCI Express x1	3
PCI Express x16	1

BAYS

	SFF/TWR
Media Card Reader	1
Slim Optical Disc Drive	1
3.5" internal storage drive	1 - SFF 2 - TWR
2.5" internal storage drive	1

Standard Features and Configurable Components (availability may vary by country)

SERVICE AND SUPPORT

On-site Warranty [1]: Three-year (3-3-3) limited warranty delivers three years of on-site, next business day [2] service for parts and labor and includes free telephone support [3] 24 x 7. Three-year onsite and labor are not available in all countries. Service offers terms up to 5 years by choosing a Care Pack. To choose the right level of service for your HP product, visit HP Care Pack Central: www.hp.com/go/cpc

NOTE 1: Terms and conditions may vary by country. Certain restrictions and exclusions apply. Other warranty variations may be offered in your region.

NOTE 2: On-site service may be provided pursuant to a service contract between HP and an authorized HP third-party provider, and is not available in certain countries. Global service response times are based on commercially reasonable best effort and may vary by country.

NOTE 3: Technical telephone support applies only to HP-configured Compaq and third-party HP qualified hardware and software. Toll-free calling and 24 x 7 support may not be available in some countries.

OPERATING SYSTEMS

Preinstalled

Windows 8 Pro (64-bit)*
Windows 8 (64-bit)*
Windows 7 Ultimate (32-bit)** (LAR only)
Windows 7 Ultimate (64-bit)**
Windows 7 Professional (32-bit)**
Windows 7 Professional (64-bit)**
Windows 7 Professional (32-bit) (available through downgrade rights from Windows 8 Pro)***
Windows 7 Professional (64-bit) (available through downgrade rights from Windows 8 Pro)***
Windows 7 Home Premium (32-bit)** (LAR only)
Windows 7 Home Premium (64-bit)**
FreeDOS 2.0
Novell SUSE Linux Enterprise Desktop 11

For all Preinstalled operating systems HP provides Microsoft WHQL certified (where applicable) drivers on www.hp.com at the time of product announcement.

Web Support

Windows 7 Enterprise (32-bit or 64-bit)
Windows 8 (64-bit)
Windows 8 Pro (64-bit)*
Windows 8 Enterprise (64-bit)**

For all Supported operating systems HP performs testing of the OS, and makes available all HP value add software (OS dependent). Certified drivers are made available on www.hp.com within 30 days of product announcement.

Limited Support

For all Limited Support operating systems HP will make available on www.hp.com certified drivers for major subsystems, if not provided by the operating system, within 30 days of product announcement.

HP performs functional testing on representative configurations. Some newer technologies may not be supported.

HP value added software and 3rd party applications (i.e. DVD players) are not supported.

Certified

Novell SUSE Linux Enterprise Desktop 111

Red Hat Enterprise Linux 641

For all Certified operating systems HP will submit hardware to the operating system vendor for testing and certification. All drivers would be obtained from the operating system vendor, not supplied by HP. Certification will be posted by the operating system vendor.

Test & Document

Windows® Vista Enterprise (32-bit or 64-bit)
Windows® Vista Professional (32-bit or 64-bit)
Windows ® XP Professional (32-bit)

For all Test & Document operating systems HP will perform functional testing of the operating system on the HP business PC platform. Any issues found will be documented in an Engineering Advisory and/or Service Advisory and posted to www.hp.com. HP will not develop or qualify any drivers or perform any integration testing.

*Not all features are available in all editions of Windows 8. Systems may require upgraded and/or separately purchased hardware, drivers and/or software to take full advantage of Windows 8 functionality. See http://www.microsoft.com.

**Not all features are available in all editions of Windows 7. This system may require upgraded and/or separately purchased hardware to take full advantage of Windows 7 functionality. See http://www.microsoft.com/windows/windows-7/ for details.
***This system is preinstalled with Windows® 7 Pro software and also comes with a license and media for Windows 8 Pro software. You may only use one version of the Windows software at a time. Switching between versions will require you to uninstall one version and install the other version. You must back up all data (files, photos, etc.) before uninstalling and installing operating systems to avoid loss of your data.

[1]The following features are not supported by Novell SUSE Linux Enterprise Desktop:

- Intel Gigabit CT Desktop NIC
- Broadcom NetXtreme Gigabit Ethernet Plus
- HP 14-in-1 Media Card Reader
- HP Client Security
- HP Blu-ray Writer playback of commercial movies
- DisplayPort video interface
- HP 2nd serial port adapter
- Power Management features

Systems configured with Linux do not qualify for ENERGY STAR®Systems configured with Linux do not qualify for ENERGY STAR®

SSOFTWARE COMPONENTS AND APPLICATIONS WITH WINDOWS

Included	Windows 7	Windows 8
Security	Computrace (status tracing)[1] Device Access Manager Drive Encryption File Sanitizer (Activated via Wizard) Disk Sanitizer (external version)2 Microsoft Security Essentials HP Client Security	Computrace (status tracing) [1] Device Access Manager Drive Encryption File Sanitizer (Activated via Wizard) Disk Sanitizer (external version)2 Microsoft Defender Secure Erase HP Client Security
MultiMedia	Cyberlink Media Suite Cyberlink PhotoDirector Cyberlink Power Director Cyberlink Power DVD, BD Cyberlink Power2Go (Secure Burn)	Cyberlink Media Suite Cyberlink PhotoDirector Cyberlink Power Director Cyberlink Power DVD, BD Cyberlink Power2Go (Secure Burn)
Communication		HP Wireless Hotspot
HP Value Add	HP ePrint Driver[3] HP PageLift HP Support Assistant HP Recovery Disk Creator	HP ePrint Driver[3] HP PageLift HP Recovery Manager HP Support Assistant HP QuickStart
3rd Party	Adobe Flash Player Bing Search for Internet Explorer 10 Box Evernote PDF Complete Skype	Bing Search Evernote PDF Complete, Corporate Edition Skype
Microsoft Products	Buy Office	Buy Office

[1] Computrace agent is shipped turned off, and must be activated by customers when they purchase a subscription. Subscriptions can be purchased for terms ranging from one to five years. Service is limited, check with Absolute for availability outside the U.S.

[2] Available via download

[3] Requires an Internet connection to HP web-enabled printer and HP ePrint account registration (for a list of eligible printers, supported documents and image types and other HP ePrint details, see www.hp.com/go/eprintcenter).Requires optional

broadband module. Broadband use requires separately purchased service contract. Check with service provider for coverage and availability in your area. Separately purchased data plans or usage fees may apply. Print times and connection speeds may vary

INTEL 4th GENERATION CORE vPRO PROCESSORS

All HP ProDesk 600 G1 Business PC models include processors that are part of the Intel 2013 Stable Image Platform Program (SIPP) designed to ensure the stability promise inherent in the value proposition of the ProDesk 600, thus making these models the most stable, secure, and manageable platforms available to enterprises today.

Intel HD Graphics

VGA Controller	Integrated
DisplayPort	Multimode capable; supports HDCP, Display Port Audio (2 streams), HBR2 link rates and Multi-Stream Technology for a maximum of 3 displays (including the integrated panel)
Bus Type	N/A
RAMDAC	N/A
Memory	Intel graphics do not have dedicated memory but utilizes some of the computer's system memory The amount of memory used for graphics depending on the amount of system memory installed, BIOS settings, operating system, and system load. 32 MB is pre-allocated for graphics use at system boot time. Additional memory can be allocated at boot time by the BIOS for PAVP (Protected Audio Video Playback) support for playback of protected video content. Additional memory is allocated for graphics as needed using Intel's Dynamic Video Memory Technology (DVMT), to provide an optimal balance between graphics and system memory use.
Maximum Graphics Memory	Microsoft Windows 7: Up to 1.7GB Windows 8: Up to 1.8GB **NOTE:** The actual amount of maximum graphics memory can be less than the amounts listed above depending upon your computer's configuration.
Maximum Color Depth	32 bits/pixel

Graphics/Video API Support	4th Generation Core processors:
	• The Processor Graphics contains a refresh of the seventh generation graphics core enabling substantial gains in performance and lower power consumption. Up to 16 EU support.
	• Next Generation Intel Clear Video Technology HD Support is a collection of video playback and enhancement features that improve the end user's viewing experience
	  ○ Encode/transcode HD content
	  ○ Playback of high definition content including Blu-ray Disc
	  ○ Superior image quality with sharper, more colorful images
	• DirectX Video Acceleration (DXVA) support for accelerating video processing
	  ○ Full AVC/VC1/MPEG2 HW Decode
	• Advanced Scheduler 2.0, 1.0
	• Windows 7, Windows 8, Linux OS Support
	• DirectX 11.1
	• OpenGL 4.0
	• Open CL 1.2
	Supported Display Resolutions and Refresh Rates
	NOTE: Other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

Technical Specifications - Graphics

Resolution	Refresh Rates
800x600	60 Hz
1024x768	60 Hz
1152x864	60 Hz
1280x600	60 Hz
1280x720	60 Hz
1280x800	60 Hz
1280x960	60 Hz
1280x1024	60 Hz
1360x768	60 Hz
1366x768	60 Hz
1400x1050	60 Hz
1440x900	60 Hz
1600x900	60 Hz
1600x1200*	60 Hz
1680x1050	60 Hz
1920x1080	60 Hz
1920x1200*	60 Hz
1920x1440*	60 Hz
2560x1440*	60 Hz
2560x1600*	60 Hz

* Only supported on displays connected to the external DisplayPort connector.

AMD Radeon HD 7650A Graphics Card

Form Factor	MXM 3.0
Graphics Controller	AMD Radeon HD 7650A
Core Clock	600MHz
Memory Clock	800MHz
Memory	2GB, DDR3, 128-bit wide
Bus Type	MXM
Max. Power	35W
Power Source Support	12V and 19V
3D API Support	DX11, SMS
HDCP Support	Yes
Display Max. Resolution	Digital 2560 x 1600 Analog 2048 x 1536
Supported Graphics APIs	DX11, OpenGL, full 1080p BD (H264) playback in hardware, Multi-Stream DisplayPort support

Technical Specifications - Graphics

Supported Display Resolutions and Refresh Rates

Note: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

Resolution	Refresh Rates
800 x 600	60 Hz
1024 x 768	60 Hz
1280 x 720	60 Hz
1280 x 768	60 Hz
1280 x 1024	60 Hz
1360 x 768	60 Hz
1440 x 900	60 Hz
1600 x 900	60 Hz
1680 x 1050	60 Hz
1920 x 1080	60 Hz

NVIDIA NVS 310 Graphics Card

Introduction

The NVIDIA® NVS™ 310 Graphics Card is a PCI Express low profile form factor graphics add-in card targeted as an active low cost graphics solution for the corporate business and enterprise markets.

The NVIDIA® NVS 310 graphics card is an ideal solution for customers requiring a small form factor graphics add-in card for either standard or small form factor PC designs.

Performance and Features

The NVIDIA® NVS 310 Graphics Card offers 512 MB of ultrafast DDR3 memory and is capable of supporting up to 2 displays.

DisplayPort connector supports multimode technology to support connection to DVI-D, VGA and HDMI monitors with optional adapters in kits NR078AA, FH973AT, BP937AA, AS615AA.

For a DisplayPort to DisplayPort connections use the optional DisplayPort Cable Kit VN567AA.

Form Factor

Low Profile: 2.713 × 6.15 in

Graphics Controller

NVIDIA® NVS 310

Memory Clock

875MHz

Memory Size

512 MB DDR3

Memory Bandwidth

14 GB/s

Max. Power

19.5W

Display Max. Resolution

Up to 2560 x 1600 (digital display) per display

Display Output

Up to 2 displays in the following configurations

DisplayPort output:

- Drives two DisplayPort enabled digital display at resolutions up to 2560 × 1600 at 60 Hz with reduced blanking, when connected natively using the 2 DisplayPort connectors on the NVS 310 graphics card
- Supports 2 monitors up to resolution of 1920 × 1200 at 60 Hz with reduced blanking using DisplayPort Multi-Stream topology technology.

DVI-D output:	• Drives two digital display at resolutions up to 1920 × 1200 at 60 Hz with reduced blanking using DisplayPort to DVI-D single-link cable adaptors • Drives two digital display at resolutions up to 2560× 1600 at 60 Hz with reduced blanking using DisplayPort to DVI-D dual-link cable adaptors
HDMI output:	• NVS 310 is capable of driving two high definition (HD) panels up to resolutions of 1920 × 1080P at 60 Hz using DisplayPort to HDMI cable adaptors
VGA display output:	• Drives two analog display at resolutions up to 1920 × 1200 at 60 Hz using DisplayPort to VGA cable adaptors

Supported Display Resolutions and Refresh Rates

Note: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

Resolution	DisplayPort to VGA	DisplayPort to DVI-D	DisplayPort to HDMI	DisplayPort
640 x 480	85	60	60	60
800 x 600	85	60	60	60
1024 x 768	85	60	60	60
1280 x 720	85	60	60	60
1280 x 1024	85	60	60	60
1440 x 900	75	60	60	60
1600 x 1200	60	60	60	60
1680 x 1050	60	60	60	60
1920 x 1080	60-R	60-R	60	60
1920 x 1200	60-R	60-R		60
1920 x 1440				60
2048 x 1536				60
2560 x 1600				60

NVIDIA GeForce GT630 Graphics Card

Introduction

The NVIDIA GeForce GT630 DP (2GB) PCIe x16 Card Graphics Card provides a full height, PCI Express x16 graphics add-in card solution based on the NVIDIA Kepler Architecture GPU. The card is designed to support three display connections through its DVII, and two DisplayPort connectors.

An ideal solution for desktop PC customers seeking enhanced 2D and advanced 3D graphics performance, the NVIDIA GeForce GT630 DP (2GB) PCIe x16 Cards are an excellent choice for business users who want run multiple displays from a single graphics board. Engage in Web conferencing or video or photo editing, while improving your everyday business PC experience with better graphics and excellent visual display quality.

Performance and Features

The NVIDIA GeForce GT630 DP (2GB) PCIe x16 Cards deliver superior PCI Express (PCIe) Gen 3 features including:

- Unprecedented flexibility for new applications and enhanced performance
- Support for NVIDIA surround technology
- Run multiple displays from a single graphics card

Technical Specifications - Graphics

- Full 16 lane PCIe Generation 3 bus support with peak bandwidth support
- Wireless Display ready for future support

Form Factor	PCIe x16 Card
Graphics Controller	NVIDIA Kepler Architecture GPU
Core Clock	875 MHz
Memory Clock	891 MHz
Memory Size	2 GB DDR3 128 bit
Memory Bandwidth	28.5 GB/s
Display Max. Resolution	2560 x 1600 digital, 2048 x 1536 analog
Display Output	Integrated 400 MHz RAMDAC

Supported Display Resolutions and Refresh Rates

NOTE: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

Resolution	**Maximum Refresh Rates (Hz)**	
	Analog Connection	Digital Connection
640 x 480	85	60
800 x 600	85	60
1024 x 768	85	60
1280 x 720	85	60
1280 x 1024	85	60
1440 x 900	75	60
1600 x 1200	85	60
1680 x 1050	75	60
1920 x 1080	85	60-R
1920 x 1200	85	60-R
1920 x 1440	85	60
2048 x 1536	75	60
2560 x 1600	N/A	60

NVIDIA NVS 315 1GB PCIe x 16 Graphics Card

Introduction	Get efficient dual-display graphics performance in a PCI Express low-profile graphics card with the NVIDIA NVS 315 PCIe x16 1 GB Graphics Card, an ideal desktop graphics solution for professional business and commercial applications.
Performance and Features	The NVIDIA® NVS 315 Graphics Card offers 1 GB of ultrafast DDR3 memory and is capable of supporting up to 2 displays. DisplayPort connector supports multimode technology to support connection to DVI-D, VGA and HDMI monitors with optional adapters in kits NR078AA, FH973AT, BP937AA, AS615AA. For a DisplayPort to DisplayPort connections use the optional DisplayPort Cable Kit VN567AA.
Form Factor	Low Profile: 2.713 × 6.15 in
Graphics Controller	NVIDIA® NVS 315
Memory Clock	875MHz
Memory Size	512 MB DDR3
Memory Bandwidth	14 GB/s
Connectors	DMS-59 , with support for dual VGA, dual DVI or dual Display Port with the appropriate adapter cable
Display Max. Resolution	Up to 2048 x 1536 VGA; 1920 x 1200 DVI; 2560 x 1600 DisplayPort
Display Output	Up to 2 displays in the following configurations

Supported Display Resolutions and Refresh Rates

NOTE: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

Resolution	**Maximum Refresh Rates (Hz) by Connection**	
	Analog Connection	Digital Connection
640 x 480	85	60
720 x 480	85	60
720 x 576	85	60
800 x 600	85	60
1024 x 768	85	60
1280 x 720	85	60
1280 x 768	85	60
1280 x 1024	85	60
1440 x 900	75	60
1600 x 1024	85	60
1600 x 1200	85	60
1680 x 1050	75	60
1920 x 1080	85	60-R
1920 x 1200	85	60-R
1920 x 1440	85	N/A
2048 x 1536	75	N/A
2560 x 1440	N/A	60*
2560 x 1600	N/A	60*

* Display Port Only

AMD Radeon HD 8350 1GB PCie x16 DH Graphics Card

Introduction	Get stable 2D and advanced 3D graphics performance from the AMD Radeon HD 8350 1 GB PCIe x16 DH Graphics Card, a low profile, PCI Express x16 graphics add-in card based on the AMD Radeon HD 8350 GPU, great for Web conferencing or video and photo editing.
Form Factor	PCie x16
Graphics Controller	AMD Radeon HD 8350
Core Clock	GPU engine operates at 523 MHz
Memory	1GB, DDR3, SDRAM
Memory Clock	875 MHz
HDCP Support	Yes
Display Max. Resolution	Digital 1920 x 1200 Analog 2048 x 1536

Supported Display Resolutions and Refresh Rates

NOTE: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

	Analog Connection	Digital Connection
640 x 480	85	60
720 x 480	85	60
720 x 576	85	60
800 x 600	85	60
1024 x 768	85	60
1280 x 720	85	60
1280 x 768	85	60
1280 x 1024	85	60
1440 x 900	75	75
1600 x 1024	85	60
1600 x 1200	85	60
1680 x 1050	75	75-R
1920 x 1080	85	60-R
1920 x 1200	85	60-R
1920 x 1440	85	N/A
2048 x 1536	75	N/A
2560 x 1440	N/A	N/A
2560 x 1600	N/A	N/A

AMD Radeon HD 8490 1GB PCie x16 Graphics Card

Introduction	Get impressive graphics and high resolution dual-display performance in a low profile, PCI Express x16 graphics add-in card based on the AMD Radeon HD 8490 Graphics Processor. Improve your everyday PC, Web conferencing, and video or photo editing.
Form Factor	PCie x16
Graphics Controller	AMD Radeon HD 8490
Core Clock	GPU engine operates at 875 MHz
Memory	1GB, DDR3, SDRAM
Memory Clock	900 MHz
HDCP Support	Yes
Display Max. Resolution	Digital 2560 x 1600 Analog 2048 x 1536

Supported Display Resolutions and Refresh Rates

NOTE: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

	Analog Connection	Digital Connection
300 x 200	85	60
320 x 240	85	60
400 x 300	85	60
640 x 480	85	60
720 x 480	85	60
720 x 576	85	60
800 x 600	85	60
1024 x 768	85	60
1280 x 720	85	60
1280 x 768	85	60
1280 x 1024	85	60
1440 x 900	75	75
1600 x 900	85	60
1600 x 1024	85	60
1600 x 1200	85	60
1680 x 1050	75	75-R
1920 x 1080	85	60-R
1920 x 1200	85	60-R
1920 x 1440	85	N/A
2048 x 1536	75	N/A
2560 x 1440	N/A	60
2560 x 1600	N/A	60

Technical Specifications - Hard Disk and Solid State Storage

Introduction:

HP Serial Advanced Technology Attachment (SATA) Hard Drives maximize the performance of HP Business PCs by providing the technologies to meet your increasing storage demands with high-capacity drives offering superior reliability and performance.

SATA provides faster data transfer speeds, better system cooling airflow, more bandwidth, more headroom for speed increases in future generations and better data integrity. A next-generation technology, the SATA interface connects hard drives to the PC platform enabling easy aggregation of multiple hard drives into a single PC. This offers you the additional benefits of dedicated bandwidth, the ability to more easily identify device failures and scalability. The HP ProDesk 600 G1 Series Business PC supports the latest SATA 6.0Gb/s specification.

HP Drive Lock

HP Serial ATA Hard Drives offer enhanced security via a new Drive Lock. When enabled, this ATA security feature set prevents software access to user data on the drive until one or two user-defined passwords are provided.

SMART IV Technology

Self Monitoring Analysis and Reporting Technology (SMART) hard drive technology allows hard drives to monitor their own health and to raise flags if imminent failures are predicted. If the drive determines that a failure is imminent, the SMART hard drive technology enables the intelligent manageability or management software to generate a fault alert. While the current versions of SMART hard drives do a good job monitoring the data on the hard drive media, the ever increasing emphasis on reliability and quality has promoted HP to implement SMART IV technology which constantly checks that the data flow from host interface to media and media to host interface is not compromised. This is accomplished by inserting a 2 byte parity code into every 512 byte block in the data path of the hard drive's Cache RAM. This unique parity checking performed by HP's SMART IV technology hard drives, allows for more complete error detection coverage encompassing the entire data path between the host and the hard drive.

Smart IV is also known as IOEDC: I/O Error Detection Code.

Native Command Queuing

NCQ or Native Command Queuing is a SATA protocol extension that allows the hard drive to have several write or read commands outstanding at the same time. In contrast, normal non-queued operation requires each command to be completed before the next command is issued by the host system. Queuing allows the drive to complete the commands in the order that allows for best overall throughput. It also involves an advanced method of transferring data to or from the host, called First Party Direct Memory Access (FPDMA), which allows the hard drive and the host controller to manage the data transfers for multiple outstanding commands, without involving the host processor. NCQ can contribute to better performance but the results are dependent on many factors, including the access patterns of the various applications and operating system functions that are initiating drive accesses. Enabling NCQ features in the hard drive requires AHCI support from the host system BIOS, controller, and driver. AHCI support is typically implemented in RAID configurations.

NOTE: GB = 1 billion bytes. Actual available capacity is less.

Storage Drive Support

		SFF			TWR	
	MCR	ODD	HDD	MCR	ODD	HDD
Quantity Supported	1	1	2	1	2	3
Position	1	2	1,3	2	1,3	4,5

Technical Specifications - Hard Disk and Solid State Storage

Controller

		SFF			TWR	
Hard Drive Controller	These systems provide up to four serial ATA (SATA) interfaces that support transfer rates up to 6.0 Gb/s (for ports 0 and 1, 3 Gb/s on all others) and RAID data protection functionality. These systems can also support an external SATA (eSATA) device through an optional bracket/cable assembly.					
SATA Interfaces	2 ea. SATA 3.0 1 ea. SATA 2.0			2 ea. SATA 3.0 2 ea. SATA 2.0		
Host SATA Controller	Advanced Host Controller Interface (AHCI) Revision 1.2. The specification includes a description of the hardware/software interface between system software and the host controller hardware.					

HP 500-GB 7200 RPM SATA 2.5" Self-Encrypting (SED) Hard Disk Drive

Capacity	500,107,862,016 bytes	
Rotational Speed	7,200 rpm	
Drive Type	Self-Encrypting Drive (SED) with SATA interface	
Interface	SATA Interface conforming to Serial ATA International Organization: Serial ATA Revision 2.6	
Segmented Buffer with write cache	32768 KB - A portion of buffer capacity used for firmware	
Number of Sectors	976,773,168	
Seek Time (typical reads)	Single Track:	1.0 ms
	Average:	13 ms
	Full-Stroke	25 ms
Media Diameter	2.5 in/63.5 mm	
Height	0.267 in/6.8 mm, ±0.2mm	
Width	2.75 in/69.85 mm, ±0.25mm	
Length	3.945 in/100.2 mm, ±0.25mm	
Weight	3.35 oz/95 g (max)	
Operating Temperature	32° to 140° F (0° to 60° C)	

Technical Specifications - Hard Disk and Solid State Storage

HP 1-TB SATA 6G 2.5" 8GB Solid State Hybrid Drive (SSHD) (Coming Soon)

Formatted Capacity	1 TB	
Spindle Speed	5,400 rpm +/- 0.2%	
Drive Type	Solid State Hybrid Drive (SSHD) technology with NAND Flash	
Interface	Serial ATA (SATA)	
Cache Buffer	64 MB	
NAND Flash Commercial Multilevel Cell (cMLC)	8 GB	
Number of Sectors	976,773,168	
Seek Time (typical reads)	Single Track:	2.0 ms
	Average:	12 ms
Height	0.374 +/-.008 in (9.5 +/- 0.2 mm)	
Width	2.750 +/- 0.010 in (69.85 +/- 0.25 mm)	
Length	3.951 +0.008 / -0.010 in (100.35 +0.20 / -0.25 mm)	
Weight	0.254 lb/115 g (max)	
Operating Temperature	32° to 140° F (0° to 60° C)	

HP 500 GB SATA 6G 2.5" 8GB Solid State Hybrid Drive (SSHD) (Coming Soon)

Formatted Capacity	500 GB	
Spindle Speed	5,400 rpm +/- 0.2%	
Drive Type	Solid State Hybrid Drive (SSHD) technology with NAND Flash	
Interface	Serial ATA (SATA)	
Cache Buffer	64 MB	
NAND Flash Commercial Multilevel Cell (cMLC)	8 GB	
Number of Sectors	976,773,168	
Seek Time (typical reads)	Single Track:	2.0 ms
	Average:	12 ms
Height	0.268 +/-.008 in (6.8 +/- 0.2 mm)	
Width	2.750 +/- 0.010 in (69.85 +/- 0.25 mm)	
Length	3.951 +0.008 / -0.010 in (100.35 +0.20 / -0.25 mm)	
Weight	0.209 lb/95 g (max)	
Operating Temperature	32° to 140° F (0° to 60° C)	

Technical Specifications - Hard Disk and Solid State Storage

HP 120 GB Solid State Drive

Unformatted Capacity	120 GB	
Architecture	Multi Level Cell (MLC) NAND Flash with wear leveling 10 channel controller	
Interface	Serial ATA 2.0 (3.0 Gb/s)	
Dimensions (W x H x D)	2.74 x 0.37 x 4 in (6.98 x 0.95 x 10.2 cm)	
Weight	0.18 lb (80 g)	
Bandwidth Performance	Sustained Sequential Read:	Up to 250 MB/s
	Sustained Sequential Write:	Up to 70 MB/s
	Random Read:	Up to 35K IOPs
	Random Write:	Up to 6.6K IOPs
Latency	Read:	65-ms
	Write:	85-ms
Power	DC power requirement:	5 VDC 5%-100 mV ripple p-p
	Total power consumption:	0.15W (active); 0.075W (idle)
Useful Drive Life	35TB written, up to 20GB/day for 5 years	
Environmental (all conditions, non-condensing)	Operating Temperature:	32° to 158° F (0° to 70° C)
	Relative Humidity:	5% to 95%
	Maximum Wet Bulb Temperature (operating):	84° F (29° C)
	Shock:	1,500 G/0.5-ms

* For solid state disk drives, GB means 1 billion bytes. 128GB is the unformatted capacity of this drive before a portion of the drive is reserved for flash management features. Actual capacity will vary by content

** The product achieves a mean time between failure (MTBF) based on population statistics not relevant to individual units.

HP 128 GB Solid State Drive

Unformatted Capacity	128 GB*	
Architecture	Multi Level Cell (MLC) NAND	
Interface	SATA 6 GB/sec	
Dimensions (W x H x D)	2.75 x 0.276 x 3.96 in (6.985 x 0.7 x 10.05 cm)	
Weight	0.16 lb (73 g)	
Bandwidth Performance	Sustained Sequential Read:	Up to 450 MB/ss
	Sustained Sequential Write:	Up to 260 MB/s
	Random Read (4KB):	up to 46K IOPs
	Random Write (4KB):	up to 56K IOPs
Latency	Read:	55ms (TYP)
	Write:	55ms (TYP)
Power	DC power requirement:	Min 4.5 V; Max 5.5 V
	Total power consumption:	160 mW (Active) ; <85 mW; (Idle)
Useful Drive Life	1.2 million device hours**	

Technical Specifications - Hard Disk and Solid State Storage

Environmental (all conditions, non-condensing)	Operating Temperature:	32° to 158° F (0° to 70° C)
	Relative Humidity (operating):	5% to 95%
	Shock:	1,500 G/1.0 msec
Regulations	UL, CSA, EN 60950-2000, CISPR Pub 22 Class B, CNS 13438, AS/NZS CISPR 22:2002 Class B, Korea KCC, CE Mark	

* For solid state disk drives, GB means 1 billion bytes. 128GB is the unformatted capacity of this drive before a portion of the drive is reserved for flash management features. Actual capacity will vary by content
** The product achieves a mean time between failure (MTBF) based on population statistics not relevant to individual units.

HP 160 GB Solid State Drive

Unformatted Capacity	160 GB*	
Architecture	Multi Level Cell (MLC) NAND	
Interface	SATA 3 GB/sec	
Dimensions (W x H x D)	2.74 x 0.37 x 4 in (6.98 x 0.95 x 10.2 cm)	
Weight	0.18 lb (80 g)	
Bandwidth Performance	Sustained Sequential Read:	Up to 250 MB/s
	Sustained Sequential Write:	Up to 70 MB/s
	Random Read (4KB):	up to 35K IOPs
	Random Write (4KB):	up to 6.6K IOPs
Latency	Read:	65 ms
	Write:	85 ms
Power	DC power requirement:	5 VDC 5%-100 mV ripple p-p
	Total power consumption:	0.15 Watt (Active); 0.075 Watt (Idle)
Useful Drive Life	35TB written, up to 20GB/day for 5 years **	
Environmental (all conditions, non-condensing)	Operating Temperature:	32° to 158° F (0° to 70° C)
	Relative Humidity (operating):	5% to 95%
	Shock:	1,500 G/1.0 msec
Regulations	UL, CSA, EN 60950-2000, CISPR Pub 22 Class B, CNS 13438, AS/NZS CISPR 22:2002 Class B, Korea KCC, CE Mark	

* For solid state disk drives, GB means 1 billion bytes. 128GB is the unformatted capacity of this drive before a portion of the drive is reserved for flash management features. Actual capacity will vary by content
** The product achieves a mean time between failure (MTBF) based on population statistics not relevant to individual units.

Technical Specifications - Hard Disk and Solid State Storage

HP 256 GB SATA 2.5" Self-Encrypting (SED) Solid State Drive

Unformatted Capacity	256,186,209,271 bytes	
Architecture	Self-Encrypting (SED) Solid State Drive with 25nm MLC NAND Flash and SATA interface	
Interface	Serial ATA 2.0 (3.0 Gb/s)	
NAND Flash	25nm MLC NAND Flash	
Height	.275 in/7mm	
Width	2.75 in/69.85 mm	
Length	3.95 in/100.5 mm	
Weight	0.161 lb (73 g)	
Bandwidth Performance	Sustained Sequential 128k Read:	Up to 450 MB/ss
	Sustained Sequential 128k Write:	Up to 260 MB/s
	Random 4k Read:	up to 46K IOPs
	Random 4k Write:	up to 56K IOPs
Latency	Read:	55 µs
	Write:	55 µs
Power	SATA power consumption:	160 mW (active average); <85 mW (idle average)
Useful Drive Life	72TB written, up to 40GB/day for 5 years	
Environmental (all conditions, non-condensing)	Operating Temperature:	32° to 158° F (0° to 70° C)
	Relative Humidity:	5% to 95%
	Shock:	1,500 G/1 ms

HP 500-GB 7200 rpm SATA 6.0Gb/s 3.5" Hard Disk Drive

Capacity	500,107,862,016 bytes	
Rotational Speed	7,200 rpm	
Interface	Serial ATA 3.0 (6.0 Gb/s)	
Buffer Size	16 MB	
Logical Blocks	976,773,168	
Seek Time (typical reads, includes controller overhead, including settling)	Single Track:	2.0 ms
	Average:	11 ms
	Full-Stroke:	21 ms
Height (nominal)	1 in/2.54 cm	
Width (nominal)	Media diameter: 3.5 in/8.89 cm Physical size: 4 in/10.2 cm	
Operating Temperature	41° to 131° F (5° to 55° C)	

Technical Specifications - Hard Disk and Solid State Storage

HP 1-TB 7200 rpm SATA 6.0Gb/s 3.5" Hard Disk Drive

Capacity	1,000,204,886,016 bytes	
Rotational Speed	7,200 rpm	
Interface	Serial ATA 3.0 (6.0 Gb/s)	
Buffer Size	32 MB	
Logical Blocks	1,953,525,168	
Seek Time (typical reads, includes controller overhead, including settling)	Single Track:	2.0 ms
	Average:	11 ms
	Full-Stroke:	21 ms
Height (nominal)	1 in/2.54 cm	
Width (nominal)	Media diameter: 3.5 in/8.89 cm Physical size: 4 in/10.2 cm	
Operating Temperature	41° to 131° F (5° to 55° C)	

HP Slim SuperMulti DVD Writer Drive

Height	12.7mm height	
Orientation	Either horizontal or vertical	
Interface type	SATA/ATAPI	
Disc recording capacity	Up to 8.5 GB DL or 4.7 GB standard	
Dimensions (W x H x D)	5.0 x 0.5 x 5.0 in (128 x 13.6 x 129 mm)	
Weight (max)	0.42 lb (190 g)	
Write speeds	DVD-RAM	Up to 5X
	DVD-R DL	Up to 4X
	DVD+R	Up to 8X
	DVD+RW	Up to 4X
	DVD+R DL	Up to 4X
	DVD-R	Up to 8X
	DVD-RW	Up to 6X
	CD-R	Up to 24X
	CD-RW	Up to 16X
Read speeds	DVD-RAM	Up to 5X
	DVD-RW, DVD+RW	Up to 8X
	DVD-R DL, DVD+R DL	Up to 6X
	DVD+R, DVD-R	Up to 8X
	DVD-ROM DL, DVD-ROM	Up to 8X
	CD-ROM, CD-R	Up to 24X
	CD-RW	Up to 24X
Access time (typical reads, including settling)	Random	DVD: < 140 ms (typical), CD: < 125 ms (typical)
	Full Stroke	DVD: < 250 ms (seek), CD: < 210 ms (seek)
	Stop Time	< 4 seconds
	Cache Buffer	2 MB (minimum)
	Data Transfer Modes	ATA PIO mode 4 (16.7 MB/s); ATA Multi-word DMA mode 2 (16.7 MB/s); ATA UltraDMA Mode 3 (44.4 MB/s - default)
	Source	Four-pin, DC power receptacle

Technical Specifications - Removable Storage

Power	DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p
		12 VDC ± 5%-200 mV ripple p-p
	DC Current	5 VDC (< 1000 mA typical, 1600 mA maximum)
		12 VDC (< 600 mA typical, 1400 mA maximum)
	Total Drive Power (standby mode)	< 2.5 Watt
Audio output	Line-Out	0.7 VRMS
	Signal-to-Noise Ratio	74 dB
	Channel Separation	65 dB
Environmental conditions (operating - non-condensing)	Temperature	41° to 122° F (5° to 50° C)
	Relative Humidity	10% to 90%
	Maximum Wet Bulb Temperature	86° F (30° C)

HP Slim Blu-ray BDXL Drive

Height	12.7mm Slim tray-load
Orientation	Either horizontal or vertical
Interface type	SATA/ATAPI
Disc capacity	Up to 128 GB QL, 100 GB TL, 50 GB DL or 25 GB standard SL
Dimensions W x H x D (max)	5.04 x 0.5 x 5.0 in (128 x 12.7 x 127 mm) without bezel
Weight (max)	Up to 0.37 lb (170 g) without bezel

Write speeds		**Triple-layer**	**Quadruple-layer**
	BD-R	Up to 4x	Up to 4x
	BD-RE	Up to 2x	Not supported
		Single-layer	**Double-layer**
	BD-R	Up to 6x	Up to 6x
	BD-RE	Up to 2x	Up to 2x
	DVD-R	Up to 8x	Up to 6x
	DVD-RW	Up to 6x	Not supported
	DVD+R	Up to 8x	Up to 6x
	DVD+RW	Up to 8x	Not supported
	DVD-RAM	Up to 5x	N/A
	CD-R	Up to 24x	N/A
	CD-RW	Up to 24x	N/A
		Triple-layer	**Quadruple-layer**

Technical Specifications - Removable Storage

	BD-R	Up to 4x	Up to 4x
	BD-RE	Up to 4x	Not supported
		Single-layer	**Double-layer**
	BD-ROM	Up to 6x	Up to 6x
	BD-R	Up to 6x	Up to 6x
	BD-RE	Up to 6x	Up to 6x
	DVD-ROM	Up to 8x	Up to 8x
	DVD-R	Up to 8x	Up to 8x
Read speeds	**DVD-RW**	Up to 8x	Not supported
	DVD+R	Up to 8x	Up to 8x
	DVD+RW	Up to 8x	Not supported
	BDMV (AACS Compliant Disc)	Up to 6x/2x (Read/Play)	
	DVD-RAM	Up to 5x	
	DVD-Video (CSS Compliant Disc)	Up to 8x/4x (Read/Play)	
	CD-R/RW/ROM	Up to 24x	
	CD-DA (DAE)	Up to 20x/10x (Read/Play)	
Access times (typical reads, including setting)	**Random**	BD-ROM: 205 ms (typical), DVD-ROM: 185 ms (typical), CD-ROM: 165 ms (typical)	
	Full Stroke	BD-ROM: 350 ms (typical), DVD-ROM: 345 ms (typical), CD-ROM: 340 ms (typical)	
Power	**Source**	Slimline SATA DC power receptacle	
	DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p	
	DC Current	5 VDC -1200 mA typical, 2000 mA maximum	
Environmental (all conditions non-condensing)	**Temperature** (operating)	41° to 122° F (5° to 50° C)	
	Relative Humidity (operating)	10% to 80%	
	Maximum Wet Bulb Temperature (operating)	86° F (30° C)	

Technical Specifications - Removable Storage

HP Slim DVD-ROM Drive

Height	12.7mm	
Orientation	Either horizontal or vertical	
Interface type	SATA/ATAPI	
Dimensions (W x H x D)	5.0 x 0.5 x 5.0 in (128 x 13.6 x 129 mm)	
Weight (max)	0.42 lb (190 g)	
Read speeds	DVD+R/-R/+RW/ -RW/+R DL /-R DL	Up to 4X
	DVD-ROM	Up to 8X
	CD-ROM, CD-R	Up to 24X
	CD-RW	Up to 24X
Access time (typical reads, including settling)	Random DVD	DVD: < 140 ms (typical), CD: < 125 ms (typical)
	Random CD	DVD: < 250 ms (seek), CD: < 210 ms (seek)
	Data Transfer Modes	ATA PIO mode 4 (16.7 MB/s); ATA Multi-word DMA mode 2 (16.7 MB/s)
Power	Source	Four-pin, DC power receptacle
	DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p
	DC Current	5 VDC - <1000 mA typical, < 1600 mA maximum
	Total Drive Power (standby mode)	< 2.5 Watt
Audio output	Line-Out	0.7 VRMS
	Signal-to-Noise Ratio	74 dB
	Channel Separation	65 dB
Environmental (all conditions non-condensing)	Temperature	41° to 122° F (5° to 50° C)
	Relative Humidity	5% to 85%
	Maximum Wet Bulb Temperature (operating)	86° F (30° C)

System Memory Support

The HP ProDesk 600 G1 Business PC supports 4rd generation Intel® Core™ processor families. Based on a new PC micro-architecture, the processor is designed for a two-chip platform consisting of a processor and Platform Controller Hub (PCH). Unlike previous generations, the processor includes an integrated memory controller (IMC). The IMC supports DDR3 protocols with two independent, 64-bit wide channels each accessing one or two DIMMs.

- Two channels of non-ECC DDR3 unbuffered dual in-line memory modules (UDIMM) or DDR3 unbuffered small outline dual in-line memory modules (SO-DIMM) with a maximum of two DIMMs per channel
- Single-channel and dual-channel memory organization modes
- Data burst length of eight for all memory organization modes
- DDR3 memory data transfer rates of up to 1600 MT/s; actual supported DDR3 data transfer rate determined by the configured processor.
- 64-bit wide channels
- DDR3 system memory I/O voltage of 1.5V
- Theoretical Maximum Memory Bandwidth:
  - 10.6 GB/s in single-channel mode of 21.3 GB/s in dual-channel mode assuming DDR3 1333 MT/s
  - 12.8 GB/s in single-channel mode or 25.6 GB/s in dual-channel mode assuming DDR3 1600 MT/s
  - 32 GB maximum memory support depending upon available number of DIMM sockets
- DDR3-1600 (PC3-12800) DIMMs are supported but limited to the 1333 MT/s data transfer rate when not configured with IvyBridge generation chipset.

CAUTION: You must shut down the computer and disconnect the power cord before adding or removing memory modules. Regardless of the power-on state, voltage is always supplied to the memory modules as long as the computer is plugged in to an active AC outlet. Adding or removing memory modules while voltage is present may cause irreparable damage to the memory modules or system board.

Memory Configurations: Small Form Factor / Towers

Slot 1 is black and must always be populated. Not all memory configurations possible are represented below.

NOTE: For systems configured with more than 3 GB of memory and a 32-bit operating system, all memory may not be available due to system resource requirements. Addressing memory above 4 GB requires a 64-bit operating system.

Total Memory	Socket			
	Channel A (black)		Channel B (black)	
	1 (black)	2 (white)	3 (white)	4 (white)
4 GB (dual channel)	4 GB	unpopulated	1 GB	unpopulated
8 GB (dual channel)	4 GB	2 GB	GB	GB
16 GB (dual channel)	8 GB	4 GB	4 GB	4 GB

Intel® I1217LM GbE Network Connection (integrated)

Connector	RJ-45
System Interface	Integrated on PCA
Controller	Intel I217LM GbE platform LAN connect networking controller
Memory	24 KB FIFO packet buffer memory
Data rates supported	10/100/1000 Mbps
IEEE Compliance	802.1P 802.1Q 802.2 802.3 802.3ab 802.3az 802.3u
Bus architecture	PCI Express and SMBus
Data transfer mode	PCIe-based interface for active state operation (S0 state) and SMBus for host and management traffic (Sx low power state)
Power requirement	Requires 3.3V and 0.9V or just 3.3V with integrated regulators Power consumption 0.733 Watts
Boot ROM support	Yes
Network transfer mode	Full-duplex Half-duplex (not supported for the 1000BASE-T transceiver)
Network transfer rate	10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T (full-duplex) 2000 Mbps
Environmental	Operating Temperature: 0° to 85° C Operating Humidity: 60% RH
Management	WOL, auto MDI crossover, PXE, Muti-port teaming, RSS, Advanced cable diagnostic
Alerting	ASF 2.0 support; AMT 9.0 support

Intel Centrino Advance-N 6205 Wireless Network Interface Connection

Wireless LAN Standards	IEEE 802.11a/b/g/n IEEE 802.11 e, 802.11i, 802.11d, 802.11d, 802.11h
Interoperability	Wi-Fi certified (802.11 a/b/g/n WMM, WPA, WPA2 and WPS) Tested with wireless access points from several major manufacturers OS compatible with Microsoft Windows, Win7 and XP Cisco Compatible Extensions Program compliant (802.11a/b/g only) with Microsoft Windows XP and Windows 7
Frequency Band	2.4 GHz and 5 GHz
Antenna Structure	2 transmit; 2 receive (2x2)

Technical Specifications - Communications

Data Rates	802.11b: 1, 2, 5.5, 11 Mbps 802.11a/g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n: 66 possible data rates, ranging from 6 Mbps to 300 Mbps, depending on the combination of Bandwidth, Modulation Coding Scheme, and Guard Interval used, as defined in IEEE 802.11n specification	
Modulation	Direct Sequence Spread Spectrum DBPSK, DQPSK, CCK, OFDM, BPSK, QPSK, 16-QAM, 64-QAM	
Security	Supports 64- and 128-bit WEP, WPA, WPA2, hardware-accelerated AES (support for key sizes of 128bits), TKIP, 802.1x authentication types EAP-TLS, EAP-TTLS, PEAP, MSCHAP, PEAP-MSCHAPv2, LEAP, EAP-FAST, EAP-SIM, EAP-AKA PAP, CHAP, TLS, GTC Support for Cisco Security Features (proven compatibility with Cisco Aironet infrastructure products through the Cisco Compatible Extensions Program Version 4) with Microsoft Windows XP only.	
Sub-channels	Multinational support with frequency bands and channels compliant to local regulations.	
Media Access Protocol	CSMA/CA (Collision Avoidance) with ACK	
Network Architecture Models	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required) Intel® My Wifi Technology (iPAN)	
Roaming	Provide seamless roaming between like access points (same frequency band)	
Output Power (for CCK)	15 dBm	
Output Power (for OFDM; power varies by data rate)	15 dBm	
Power Consumption	Transmit: 2.3 Watts (average, with one spatial streams) Receive: 1.9 Watts (average with two receive chains) Idle mode: 30mW – 40mW (average) Radio off: 20 mW (max)	
Power Management	ACPI compliant power management 802.11 compliant power saving mode	
Antenna Connections	3 U.FL type connectors, 50 ohm nominal impedance	
Range	802.11 a - Typical (@6 Mbps)	600 feet - Outdoor Open Area 150 feet - Indoor, Office environment
	802.11 b - Typical (@1 Mbps)	1200 feet - Outdoor Open Area 300 feet - Indoor, Office environment
	802.11 g - Typical (@1 Mbps)	1200 feet - Outdoor Open Area 300 feet - Indoor, Office environment
Form Factors	USDT:	MiniPCI-Express
	CMIT & SFF:	PCIe
Weight	0.013 lb (4.0 g)	
Dimensions	1.1 x 1.2 in (26.8 x 30.0 mm)	
Operating Voltage	3.3V +/- 9%, 1.5V +/- 5%	
Temperature	**Operating:** **Non-operating:**	32° to 176° F (0° to 80° C) -40° to 176° F (-40° to 80° C)
Humidity	**Operating:** **Non-operating:**	10% to 90% (non-condensing) 5% to 90% (non-condensing)

Technical Specifications - Communications

	Microsoft Windows XP	Microsoft Windows Win 7
Configuration Utility	• Microsoft Windows XP Wireless Network Connection Manager • Intel PROSet for Microsoft Windows XP (required for Cisco Compatible Extensions support)	• Intel IHV extensions for Win7 available to support Cisco Compatible Extensions

Technical Specifications - Audio

High Definition Audio

Type	Integrated
HD Stereo Codec	Realtek 2-channel ALC221 codec
Audio I/O Ports	Front microphone-In (150-K ohm Input Impedance) Rear Line-In/Microphone input (150-K ohm Input Impedance, function is configurable by audio driver) Rear Line-Out* (190 ohms Output Impedance, expects at least a 10-K ohm load) Front Headphone-Out (0.5 Ohm Output Impedance, expects at least a 32 ohm load) Front Microphone/Headphone jack is re-task able to provide Microphone input, line-in or Headphone output to support connecting two headphones to the front of the system. When configured as a second front headphone output, both front headphone outputs are always driven with the same signal. All ports are 3.5mm
Internal Speaker Amplifier	1.5W amplifier for the internal speaker only. External speakers must be powered externally. Rear Line-in audio port is re-taskable as either Line-in or Microphone-In.
Multi-streaming Capable	Multi-streaming can be enabled in the Realtek control panel to allow independent audio streams to be sent to/from the front and rear jacks.
Sampling	8 kHz - 192 kHz
Wavetable Syntheses	Yes – Uses OS soft wavetable
Analog Audio	Yes
# of Channels on Line-Out	Stereo (Left & Right channels)
Internal Speaker	Yes
External Speaker Jack	Yes
Full Duplex	Yes

HP USB Keyboard

	Keys	104, 105, 106, 107, 109 layout (depending upon country)
Physical characteristics	Dimensions (L x W x H)	18.12 x 6.47 x 0.96 in (46.03 x 16.43 x 2.44 cm)
	Weight	2 lb (0.9 kg)
Electrical	Operating voltage	+ 5VDC ± 5%
	Power consumption	50-mA maximum (with three LEDs ON)
	System interface	USB Type A plug connector
	ESD	CE level 4, 15-kV air discharge
	EMI - RFI	Conforms to FCC rules for a Class B computing device
	Microsoft® PC 99 - 2001	Functionally compliant
Mechanical	Keycaps	Low-profile design
	Switch actuation	55-g nominal peak force with tactile feedback
	Switch life	20 million keystrokes (using Hasco modified tester)
	Switch type	Contamination-resistant switch membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	6 ft (1.8 m)
	Microsoft PC 99 - 2001	Mechanically compliant
Environmental	Acoustics	43-dBA maximum sound pressure level
	Operating temperature	50° to 122° F (10° to 50° C)
	Non-operating temperature	-22° to 140° F (-30° to 60° C)
	Operating humidity	10% to 90% (non-condensing at ambient)
	Non-operating humidity	20% to 80% (non-condensing at ambient)
	Operating shock	40 g, six surfaces
	Non-operating shock	80 g, six surfaces
	Operating vibration	2-g peak acceleration
	Non-operating vibration	4-g peak acceleration
	Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
	Drop (in box)	30 in (76.2 cm) on concrete, 16-drop sequence
Approvals	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC	
Ergonomic compliance	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, KC	

Technical Specifications – Keyboards and Pointing Devices

Kit contents	Keyboard	Installation Guide
	Warranty Card	Safety and Comfort Guide

HP PS/2 Keyboard

Physical Characteristics	Keys	104, 105, 106, 107, 109 layout (depending upon country)
	Dimensions (L x W x H)	18.22 x 6.47 x 1.1 in (46.28 x 16.43 x 2.79 cm)
	Weight	2 lb (0.9 kg) minimum
Electrical	Operating voltage	+ 5VDC ± 5%
	Power consumption	50-mA maximum (with three LEDs ON)
	System interface	PS/2 6-pin mini din connector
	ESD	CE level 4, 15-kV air discharge
	EMI - RFI	Conforms to FCC rules for a Class B computing device
Mechanical	Microsoft PC 99 - 2001	Functionally compliant
	Keycaps	Low-profile design
	Switch actuation	55-g nominal peak force with tactile feedback
	Switch life	20 million keystrokes (using Hasco modified tester)
	Switch type	Contamination-resistant switch membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	6 ft (1.8 m)
	Microsoft PC 99 - 2001	Mechanically compliant
Environmental	Acoustics	50-dBA maximum sound pressure level
	Operating temperature	32° to 104° F (0° to 40° C)
	Non-operating temperature	-22° to 149° F (-30° to 65° C)
	Operating humidity	15% to 80% (non-condensing at ambient)
	Non-operating humidity	15% to 90% (non-condensing at ambient)
	Operating shock	N/A
	Non-operating shock	65 inch 2.9 ms, six surface; 30g 266 inch/second; 50g 266 inch/second six surface
	Operating vibration	2-g peak acceleration

	Non-operating vibration	Starting at 5 Hz, vary the frequency of vibration from 5 to 500 Hz and back to 5 Hz at a Logarithmic sweep rate of 1 octave per minute.
	Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
	Drop (in box)	29.93 in (76 cm) on concrete, 16-drop sequence
Approvals	CUL, ICES-003 Class B, FCC, CE Mark,TUV GS, VCCI, BSMI, C-Tick, KC	
Ergonomic compliance	ANSI HFS 100, ISO 9241-4, and TUVGS	

HP USB Smart Card (CCID) Keyboard

Key Benefits:

- Protects against unauthorized access with smart card technology
- Delivers even greater security when combined with a HP ProtectTools smart card and the HP ProtectTools Security Software
- Combination of username and password or pin with a smart card or security token
- Secures online transactions using digital signatures and certificates
- Conforms to industry standards for ease of setup and use
- Delivers long product life and quiet operation with high-impact materials and lubricated keys
- Spill drain feature

Physical Characteristics	Keys	104, 105, 106, 107, 109 layout (depending upon country
	Form factor	USB basic smart card keyboard
	Colors	Carbonite/Silver
	Dimensions (H x W x D)	18.2 x 6.3 x 1.3 in (46.3 x 16.1 x 3.3 cm)
	Weight	2 lb (0.9 kg) minimum
Electrical	Operating voltage	+ 5VDC ± 5%
	Power consumption	100-mA maximum (with four LEDs ON)
	System interface	USB Type A plug connector
	ESD	CE level 4, 15-kV air discharge
	EMI - RFI	Conforms to FCC rules for a Class B computing device
	Microsoft PC 99 - 2001	Functionally compliant
	Languages	30+ available
Mechanical	Keycaps	Standard design
	Switch actuation	55 g nominal peak force with tactile feedback
	Switch life	20 million keystrokes (using Hasco modified tester)
	Switch type	Contamination-resistant membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	6 ft (1.8 m)
	Microsoft PC 99 - 2001	Mechanically compliant
	Acoustics	43-dBA maximum sound pressure level
	Operating temperature	50° to 122° F (10° to 50° C)

Technical Specifications – Keyboards and Pointing Devices

Environmental	Non-operating temperature	-22° to 140° F (-30° to 60° C)	
	Operating humidity	10% to 90% (non-condensing at ambient)	
	Non-operating humidity	20% to 80% (non-condensing at ambient)	
	Operating shock	40 g, six surfaces	
	Non-operating shock	80 g, six surfaces	
	Operating vibration	2-g peak acceleration	
	Non-operating vibration	4-g peak acceleration	
	Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence	
	Drop (in box)	42 in (107 cm) on concrete, 16-drop sequence	
SmartCard Function	Support	All ISO 7816 smart cards	
	Interface	Reads from and writes to all ISO7816-1, 2, 3, 4 memory and microprocessor smart cards (T=0, T=1)	
	Chipset	SCM STCIII	
	Standard APIs supported	PC/SC, EMV2000, CT-API	
	Power	USB Port	
		Short circuit detection (protects smart card and reader)	
		Power supply compliant with ISO7816 and EMV (5V, 60 mA)	
		Supports 3-V and 5-V cards	
	Power consumption	100-mA maximum draw	
	Communication	From card	9600 bps to 330,000 bps
		From computer	12 Mbps (USB transfer speed)
	Landing mechanism	Contact device	Friction contact
		Card insertions rating	Up to 100,000 insertion cycles
	Interface modes	CCID protocol	
	Reader performance interface	USB connection	
	Electro-magnetic standards	Europe	2004/108/EC
		USA	USAFCC part 15
Approvals	CE-Mark, UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC, EMV2000, USB-IF		
Ergonomic Compliance	ISO 9241-4, TUVGS		
Kit Contents	Keyboard, I/O Security and Documentation CD, warranty card		

HP USB PS/2 Washable Keyboard

Physical Characteristics	Keys	104 (US) layout or 105 (EU) layout – depending upon country
	Dimensions (L x W x H)	17.67x 6.62 x 1.38 in (449 x 168 x 35 mm)
	Weight	1.7 lb (0.77 kg) minimum
	Operating voltage	+ 5VDC ±5%

Technical Specifications – Keyboards and Pointing Devices

Electrical	Power consumption	50-mA maximum (with three LEDs ON)
	System interface	USB Type A plug connector
	ESD	CE level 4, 15-kV air discharge
	EMI - RFI	Conforms to FCC rules for a Class B computing device
	Microsoft® PC 99 - 2001	Functionally compliant
Mechanical	Keycaps	Stepped -profile design
	Switch actuation	55-g nominal peak force with tactile feedback
	Switch life	20 million keystrokes
	Switch type	Contamination-resistant switch membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	7 ft (2.2 m)
	Microsoft PC 99 - 2001	Mechanically compliant
Environmental	Acoustics	43-dBA maximum sound pressure level
	Operating temperature	50° to 122° F (10° to 50° C)
	Non-operating temperature	-22° to 140° F (-30° to 60° C)
	Operating humidity	10% to 95% (non-condensing at ambient)
	Non-operating humidity	0% to 95% (non-condensing at ambient)
	Operating shock	40 g, six surfaces
	Non-operating shock	80 g, six surfaces
	Operating vibration	2-g peak acceleration
	Non-operating vibration	4-g peak acceleration
	Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
	Drop (in box)	42 in (107 cm) on concrete, 16-drop sequence
Operating system support	Windows® 7, Windows Vista, Windows XP Professional	
Approvals	UL, cUL, FCC, CE, TUV GS, VCCI, BSMI, C-Tick, KCC, USB-IF, WHQL, EN/IEC 60601-1, IP66/NEMA4X	
Ergonomic compliance	ANSI HFS 100, ISO 9241-4, and TUVGS	

HP Wireless Keyboard and Mouse

Keyboard	Dimensions (H x L x W)	1.09 x 18.1 x 6.47 in (27.87 x 460.3 x 164.3 mm)
	Weight – Without Two AA Alkaline Batteries	1.94 lb (880 g)
Mouse	Dimensions (H x L x W)	1.46 x 4.53 x 2.47 in (37 x 115 x 62.9 mm)
	Weight – Without Two AA Alkaline Batteries	0.15 lb (67 g)
Receiver	Dimensions (H x L x W)	0.33 x 1.79 x 0.72 in (8.4 x 45.5 x 18.4 mm)
	Weight	0.21 oz (5.9 g)
	Cable Length – Minimum	6 ft (1.8 m)
	Range	32.8 ft (10 m)
System Requirements	Windows 7 Home Basic*, Windows 7 Home Premium*, Windows 7 Professional Edition 32*, Windows 7 Professional Edition 64*, Windows 7 Ultimate Edition 32*, Windows 7 Ultimate Edition 64* Windows Vista or Windows XP Available USB port for the receiver CD-ROM Drive *This system may require upgraded and/or separately purchased hardware and/or a DVD drive to install the Windows 7 software and take full advantage of Windows 7 functionality. See http://www.microsoft.com/windows/windows-7/ for details.	
Approvals	Product Safety	UL; CSA /TUV (Europe only); CE Mark; CB Report
	Ergonomics	ANSI; ISO (Europe only); GS Mark (Germany only)
	EMC	FCC; CE; ACA (-tick); BSMI; KC ; VCCI
	CE Mark	EN 55022:2010; EN 55024; EN 301489-1; EN 61000
	Design Guidelines for PCs	PC 99 - connector overmold colors; PC 2001 - full functionality
	Telecom	All local telecom requirements and approvals for intended markets
	USA	FCC Title 47 CFR, Par 15, Subpart C; other local requirements
	Country Support	US, Belgium, Switzerland, Spain, Denmark, Netherlands, France, Germany, Italy, Portugal, Sweden, Norway, Finland, UK, Poland, Czech Republic, Turkey, Greece, Austria, Bulgaria, Cyprus, Estonia, Hungary, Ireland, Latvia, Lithuania, Luxemburg, Malta, Romania, Slovakia, Slovenia, Vietnam, HK, Australia, NZ, Malaysia, Singapore, Indonesia, Philippines, Thailand, Canada, China, Japan, Korea, Taiwan, India, Venezuela, Ecuador, Russia, Ukraine, Israel, Croatia, United Arab Emirates, Peru, Brazil, Chile, Argentina, Mexico, South Africa, and up to 193 countries worldwide.

Technical Specifications – Keyboards and Pointing Devices

HP PS/2 Mouse

Dimensions (H x L x W)	1.46 x 2.48 x 4.53 in (3.70 x 6.29 x 11.50 cm)	
Weight	3.53 oz (100g; +10g/- 5 g)	
Environmental	Operating temperature	-32° to 104°F (0° to 40° C)
	Non-operating temperature	-4° to 140°F (-20° to 60° C)
	Operating humidity	10% to 90% (non condensing at ambient)
	Non-operating humidity	10% to 90% (non condensing at ambient)
	Operating shock	40 g, 6 surfaces
	Non-operating shock	80 g, 6 surfaces
	Operating vibration	2 g peak acceleration
	Non-operating vibration	4 g peak acceleration
	Drop (out of box)	80 cm height onto asphalt tile over concrete or equivalent, 5-drop in 5 direction except the cable face
Electrical	Operating voltage	5 VDC ± 10%
	Power consumption	100mA
	System consumption	PS/2 mini-din connector
	ESD	CE level 4, 15 kV air discharge
	EMI-RFI	Conforms to FCC rules for a Class B computing device
	Microsoft PC99 - 2001	Functionally compliant
Mechanical	Resolution	800 DPI
	Tracking speed	10 in/s (25.4 cm/s) maximum
	Acceleration	±15%
	Switch actuation	65±20 gf
	Switch life	3,000,000 operations (using Hasco modified tester)
	Switch type	Low force micro-switches
	Tracking mechanism life	80 km
	Cable length	6 ft (1.8 m)
	Microsoft PC99 - 2001	Mechanically compliant
	Width	6 mm
	Diameter	22.5 ± 0.2 mm

Technical Specifications – Keyboards and Pointing Devices

Scroll wheel	Maximum rotation force	50 gf-cm
	Switch type	Light force micro-switch
	Switch life	1 million operations
	Mechanical life	Minimum 200,000 revolutions
Regulatory Approvals	UL/cUL, FCC, CE Mark, TUV/GS, VCCI, KCC, BSMI, C-Tick	

HP USB Mouse

Dimensions (H x L x W)	1.5 x 4.5 x 2.5 in (3.8 x 11.6 x 6.3 cm)
Weight	0.22 lb (0.10 kg)
Cable length	70.9 in (180 cm)
System requirements	Available USB port

HP USB 1000dpi Laser Mouse

Dimensions (H x L x W)	1.47 x 4.53 x 2.47 in (37.3 x 114.97 x 62.86 mm)	
Weight	3.360 oz (102g)	
Cable length	70.9 in (180 cm)	
System requirements	Available USB port	
Environmental	Operating Temperature	32° to 104° F (0° to 40° C)
	Non-operating Temperature	-4° to 140° F (-20° to 60° C)
	Operating Humidity	10% to 90% (non-condensing at ambient)
Mechanical	Resolution	1000dpi
	Tracking Speed	45 cm/sec
	Cable Length	70.9 in (180 cm)

Technical Specifications – Keyboards and Pointing Devices

HP USB PS/2 Washable Mouse

Dimensions (H x L x W)	1.56 x 2.44 x 4.61 in (3.95 x 6.21 x 11.7 cm)	
Weight	4.44 oz (126 g)	
Environmental	Operating temperature	–32° to 104°F (0° to 40° C)
	Non-operating temperature	–4° to 140°F (–20° to 60° C)
	Operating humidity	10% to 90% (non-condensing at ambient)
	Non-operating humidity	10% to 90% non-condensing
	Operating shock	40 g, 6 surfaces
	Non-operating shock	80 g, 6 surfaces
	Operating vibration	2 g peak acceleration
	Non-operating vibration	4 g peak acceleration
	Drop (out of box)	80 cm height onto asphalt tile over concrete or equivalent, 5-drop in 5 direction except the cable face
Electrical	Operating voltage	5 VDC ± 10%
	Power consumption	100mA
	System consumption	PS/2 mini-din connector or USB
	ESD	CE level 2 8 kV air discharge
	EMI-RFI	Conforms to FCC rules for a Class B computing device
Mechanical	Microsoft® PC99 – 2001	Functionally compliant
	Resolution	1000 ± 20% DPI
	Tracking speed	14 in/s (35.56 cm/s) maximum
	Acceleration	2 g
	Switch actuation	70 g nominal peak force
	Switch life	3,000,000 operations (using Hasco modified tester)
	Switch type	Low force micro-switches
	Cable length	8.8 ft total 70 cm+ 2m extension
	Microsoft PC99 – 2001	Mechanically compliant
Scroll wheel	Width	6 mm
	Diameter	1 in (25.4 mm)
	Maximum rotation speed	48 rats/sec
	Switch type	Light force micro-switch
	Switch life	3 million operations
	Mechanical life	Minimum 200,000 revolutions
Regulatory approvals	Compliant	FCC, CE Mark, ICES-003-B, IP66/NEMA4X

Unit Environment and Operating Conditions

General Unit Operating Guidelines

- Keep the computer away from excessive moisture, direct moisture and the extremes of heat and cold, to ensure that unit is operated within the specified operating range.
- Leave a 10.2 cm (4 in) clearance on all vented sides of the computer to permit the required airflow.
- Never restrict airflow into the computer by blocking any vents or air intakes.
- Do not stack computers on top of each other or place computers so near each other that they are subject to each other's re-circulated or preheated air.
- Occasionally clean the air vents on the front, back, and any other vented side of the computer. Lint, dust and other foreign matter can block the vents and limit the airflow.
- If the computer is to be operated within a separate enclosure, intake and exhaust ventilation must be provided on the enclosure, and the same operating guidelines listed above will still apply.

Temperature Range	Operating: 50° to 95° F (10° to 35° C)* Non-operating: –22° to 140° F(–30° to 60° C)
Relative Humidity	Operating: 10% to 90% (non-condensing at ambient) Non-operating: 5% to 95% (non-condensing at ambient)
Maximum Altitude (unpressurized)	Operating: 10,000 ft (3048 m) Non-operating: 30,000 ft (9144 m)

*Operating temperature is de-rated 1.0 deg C per 300 m (1000 ft) to 3000 m (10,000 ft) above sea level, no direct sustained sunlight. Maximum rate of change is 10 deg C/Hr. The upper limit may be limited by the type and number of options installed.

Power Supply

	SFF	TWR
Standard Efficiency	240W active PFC	320W active PFC
High Efficiency*	240W active PFC 87/90/87% efficient at 20/50/100% load 240W active PFC 90/92/89% efficient at 20/50/100% load	320W active PFC 87/90/87% efficient at 20/50/100% load 320W active PFC 90/92/89% efficient at 20/50/100% load
Operating Voltage Range	90 - 264 VAC	90 - 264 VAC
Rated Voltage Range	100 - 240 VAC	100 - 240 VAC
Rated Line Frequency	50/60 Hz	50/60 Hz
Operating Line Frequency Range	47 – 63 Hz	47 – 63 Hz
Rated Input Current	4A	5.5A
Rated Input Current with Energy Efficient* Power Supply	4A	5.5A
Current Leakage (NFPA 99)	< 275 µA	<450=>275uA
Power Supply Fan	92=>70mm variable speed	92mm variable speed
Power cord length	6.0 ft. (1.83 m)	6.0 ft. (1.83 m)
External Power Adapter		
Dimensions	N/A	N/A
Total Cord Length	N/A	N/A

Technical Specifications – Power

*High efficiency power supply is a requirement for ENERGY STAR® qualification in conjunction with a select range of processors and modules

Technical Specifications – Weights & Dimensions

Weights & Dimensions
(configured with 1 HDD & 1 ODD)

	SFF	TWR
Chassis (W x H x D)	13.3 x 3.95 x 14.9 in 338 x 100 x 379 mm	6.7 x 15.7 x 17.4 in 170 x 399 x 442 mm
System Volume	782.7 cu in 12.8 L	1828 cu in 30 L
System Weight*	16.7 lb 7.6 kg	20.5 lb 9.3 kg
Max Supported Weight (desktop orientation)	77.0 lb 35.0 kg	N/A
Tower Stand (H x W x D)	1.1 x 7.0 x 7.9 in 29 x 178 x 200 mm	N/A
Packaging (H x W x D)	9.0 x 19.7 x 23.4 in 229 x 500 x 594 mm	11.6 x 19.7 x 23.2 in 295 x 500 x 590 mm
Shipping Weight*	17.9 lb 8.1 kg	28.8 lb 13.1 kg
Palletization Profile	4-units per layer 10-layer max. 40-units per pallet	4-units per layer 8-layer max. 32-units per pallet

Technical Specifications – Miscellaneous Features

Management Features

- Advanced Configuration and Power Management Interface (ACPI). Allows the system to wake from a low power mode. Controls system power consumption, making it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system.
- Intel Wired for Management support; industry wide initiative to make Intel architecture based PCs, servers and mobile computers more inherently manageable out-of-the-box and over the network
- Dual State Power Button; acts as both an on/off button and a suspend-to-sleep button

Serviceability Features

- Dual colored power LED on front of computer to indicate either normal or fault condition
- Diagnostic LED Explanation Table:
  - Number of 1-second red LED blinks followed by a 2-second pause, then repeats:
    - 2 - processor thermal protection activated
    - 3 - processor not installed
    - 4 - power supply failure
    - 5 -- memory error
    - 6 - video error
    - 7 - PCA failure (ROM detected failure prior to video)
    - 8 - invalid ROM, bootblock recovery mode
    - 9 - system not fetching code
    - 10 - system hang while loading an option ROM
- HP PC Hardware Diagnostics UEFI:
  - This utility enables hardware level testing outside the operating system on many components. The diagnostics can be invoked by pressing F2 at POST, and is available as a download from HP Support
- System/Emergency ROM
- Flash ROM
- CMOS Battery Holder for easy replacemen
- Flash Recovery with Video Configuration Record Software
- 5 Aux Power LED on System PCA
- Processor ZIF Socket for easy Upgrade
- Over-Temp Warning on Screen (Requires IM Agents)
- Clear Password Jumper
- DIMM Connectors for easy Upgrade
- Clear CMOS Button
- NIC LEDs (integrated) (Green & Amber)
- Dual Color Power and HD LED - To Indicate Normal Operations and Fault Conditions
- Color coordinated cables and connectors
- Tool-less Hood Removal
- Front power switch
- System memory can be upgraded without removing the system board or any internal components
- Tool-less Hard Drive, CD & Diskette Removal
- Green Pull Tabs, and Quick Release Latches for easy Identification

Technical Specifications – Miscellaneous Features

Additional Features	Description
Towerable Orientation	Product can be oriented as either a desktop or a tower
Drive Lock	Implementation of the industry standard ATA Security feature set. When enabled, it prevents software access to user data on the drive until one or two user-defined passwords are provided.
	DPS Access through F10 Setup during Boot
	A diagnostic hard drive self test. It scans critical physical components and every sector of the hard drive for physical faults and then reports any faults to the user
Drive Protection System	Running independently of the operating system, it can be accessed through a Windows-based diagnostics utility or through the computer's setup procedure. It produces an evaluation on whether the hard drive is the source of the problem and needs to be replaced
	The system expands on the Self-Monitoring, Analysis, and Reporting Technology (SMART), a continuously running systems diagnostic that alerts the user to certain types of failures
SMART Technology (Self-Monitoring, Analysis and Reporting Technology)	Allows hard drives to monitor their own health and to raise flags if imminent failures were predicted
SMART I - Drive Failure Prediction	Predicts failures before they occur. Tracks fault prediction and failure indication parameters such as re-allocated sector count, spin retry count, calibration retry count
SMART II - Off-Line Data Collection	By avoiding actual hard drive failures, SMART hard drives act as "insurance" against unplanned user downtime and potential data loss from hard drive failure
SMART III - Off-Line Read Scanning with Defect Reallocation	IOEDC: I/O Error Detection Circuitry
	Detects errors in Read/Write buffers on HDD cache RAM
SMART IV - End-to-End CRC for hard drives	Interface in F10 setup provides confirmation of SMART IV support.

Options and Accessories (sold separately)

Communication Devices

	SFF/TWR	Part Number
Intel Ethernet I210 - T1 Gbe NIC	X	E0X95AA
Intel 6205 802.11 a/b/g/n PCIe x1 NIC	X	E0X93AA

Note: The use of any of these optional NIC Cards (wired or wireless) will disable the Intel vPro Technology features.

Graphics Solutions

	SFF/TWR	Part Number
AMD Radeon HD 8350 Graphics (PCIe x16)	X	E1C63AA
AMD Radeon HD 8490 Graphics Card	X	E1C64AA
Nvidia NVS 310 Graphics (PCIe x16)	X	A7U59AA
Nvidia NVS 315 Graphics (PCIe x16)	X	E1C65AA
HP DisplayPort Cable Kit	X	VN567AA
HP DisplayPort To Dual Link DVI-D Adapter	X	NR078AA
HP DisplayPort To DVI-D Adapter	X	FH973AA
HP DisplayPort to HDMI Adapter	X	BP937AA
HP DisplayPort to VGA Adapter	X	AS615AA
HP DMS-59 to Dual DVI Cable	X	DL139A
HP DMS-59 to Dual DisplayPort Adapter	X	XP688AA

Data Storage Drives and Accessories

	SFF/TWR	Part Number
HP 500-GB 7.2K rpm SATA 6.0Gb/s 3.5” Hard Disk Drive	X	QK554AA
HP 1-TB 7.2K rpm SATA 6.0Gb/s 3.5” Hard Disk Drive	X	QK555AA
HP 128-GB SATA 3.0Gb/s Solid State Drive	X	QV063AA
HP 500-GB SATA 3.0Gb/s Solid State Hybrid Drive	X	E1C62AA
HP Slim Removable SATA Hard Drive Enclosure (frame & carrier)	X	C1N41AA
HP Slim Removable SATA Hard Drive Enclosure (carrier only)	X	E3F39AA
HP Chassis (1bay) Security Kit	TWR only	AR639AA

Options and Accessories (sold separately)

Input Devices	SFF/TWR	Part Number
HP USB Keyboard	X	QY776AA
HP USB Smart Card (CCID) Keyboard	X	BV813AA
HP USB Keyboard and Mouse Kit	X	B1T09AA
HP USB Washable Keyboard	X	VF097AA
HP USB and PS/2 Washable Mouse	X	BM866AA
HP USB and PS/2 Washable Keyboard and Mouse Kit	X	BU207AA
HP PS/2 Mouse	X	QY775AA
HP USB Mouse	X	QY777AA
HP USB 1000dpi Laser Mouse	X	QY778AA
HP Wireless Keyboard and Mouse Combination	X	QY449AA

System Memory	SFF/TWR	Part Number
HP 4GB DDR3-1600 (PC3-12800) DIMM	X	B4U36AA
HP 8GB DDR3-1600 (PC3-12800) DIMM	X	BU37AA

Multimedia Devices	SFF/TWR	Part Number
HP Slim DVD-ROM Drive	X	VP033AA
HP Slim SuperMulti DVD Writer Drive	X	QS209AA
HP USB HD 720P v2 Business Webcam	X	D8Z08AA
HP Business Headset	X	QK550AA

Removable Media Storage	SFF/TWR	Part Number
HP 14-in-1 Media Card Reader (available Dec. 2013)	X	TBD

Security Devices	SFF/TWR	Part Number
HP Solenoid Lock and Hood Sensor (SFF)	SFF only	E0X97AA
HP Solenoid Lock and Hood Sensor (TWR)	TWR only	E0X96AA
HP SFF Wall Mount/Security Sleeve	SFF only	VN570AA
HP UltraSlim Cable Lock	X	H4D73AA

Options and Accessories (sold separately)

Stands and Accessories

	SFF/TWR	Part Number
HP Integrated Work Center Stand (SFF)	SFF only	QP897AA
HP SFF Tower Stand	SFF only	VN569AA
HP 600/800 Tower Bezel Kit	TWR only	E1C66AA
HP 800/600 SFF Bezel Kit	SFF only	E3F27AA
HP Serial Port Adapter (RS-232 compatible)	X	PA716A
HP Parallel Port Kit	X	KD061AA

Monitors for Multi-display Configurations

	Part Number
HP EliteDisplay E201 20-inch LED Backlit Monitor	C9V73AA
HP EliteDisplay E221 21.5-inch LED Backlit Monitor	C9V76AA
HP EliteDisplay E231 23-inch LED Backlit Monitor	C9V75AA
HP Compaq LA2206xc 21.5-inch Webcam LCD Monitor	LW490AA

LANDesk Software (E-Delivery)

	Part Number
LANDesk Management Suite License - 1-499 Nodes E-Delivery	QY369AAE
LANDesk Management Suite License - 500-999 Nodes E-Delivery	QY370AAE
LANDesk Management Suite License - 1000-1999 Nodes E-Delivery	QY371AAE
LANDesk Management Suite License - 2000-4999 Nodes E-Delivery	QY372AAE
LANDesk Management Suite License - 5000-9999 Nodes E-Delivery	QY373AAE
LANDesk Security Suite License E-Delivery	QY379AAE
LANDesk Management Suite 1 Year Maintenance - 1-499 Nodes E-Delivery	HZ825AAE
LANDesk Management Suite 1 Year Maintenance - 500-999 Nodes E-Delivery	HZ826AAE
LANDesk Management Suite 1 Year Maintenance - 1000-1999 Nodes E-Delivery	HZ827AAE
LANDesk Management Suite 1 Year Maintenance - 2000-4999 Nodes E-Delivery	HZ828AAE
LANDesk Management Suite 1 Year Maintenance - 5000-9999 Nodes E-Delivery	HZ829AAE
LANDesk Security Suite 1 Year Subscription	HZ830AAE
LANDesk Patch Management 1 Year Subscription - 1-499 Nodes E-Delivery	HZ831AAE
LANDesk Patch Management 1 Year Subscription - 500-999 Nodes E-Delivery	HZ832AAE
LANDesk Patch Management 1 Year Subscription - 1000-1999 Nodes E-Delivery	HZ833AAE
LANDesk Patch Management 1 Year Subscription - 2000-4999 Nodes E-Delivery	HZ834AAE
LANDeskPatch Management 1 Year Subscription - 5000-9999 Nodes E-Delivery	HZ835AAE

Options and Accessories (sold separately)

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